Contrasting Expressive Content in First and Second Musical Themes[1]

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Musical themes are short and distinctive sections of music, which listeners tend to find compelling and memorable. Within Western art music, musical themes are often considered to be fundamental elements of the composition. The role of musical themes within a piece of music is both multifaceted and variable, and carries with it aesthetic and structural implications. The deployment and development of musical themes within a single piece of music and across multiple musical works has been a topic of seminal importance in music scholarship. Within writings about music, themes are sometimes even personified or discussed metaphorically. The investigation of musical themes can help determine the structure and evolution of a musical work. It can also help to fit the musical work within a wider historical and stylistic context.

Although musical works may contain any number of themes, it is common for musical works to employ two principal themes. In such works, the attributes of the two themes tend to contrast. These contrasts have been described in scholarly writings for centuries. In the eighteenth and nineteenth centuries, contrasting first and second themes were discussed by scholars such as Abbé Georg Joseph Vogler, Francesco Galeazzi, and Adolph Bernhard Marx. Within the twentieth and twenty-first centuries, preeminent scholars like Charles Rosen, William Caplin, James Hepokoski, and Warren Darcy have extensively examined differences in first and second themes. Over this period of three hundred years, the methodologies used to study musical themes changed. Despite differences among theorists who utilized these different strategies,

[1] This paper is excerpted from my master's thesis, entitled "Examining Contrasting Expressive Content within First and Second Musical Themes." For complete documentation of the presented research, the reader is encouraged to refer to the original thesis.

there exists a broad consensus regarding the expressive tendencies of first and second musical themes.

In order to examine how first and second musical themes differ, most scholars rely on standard musical analysis. There are many advantages to conducting close musical analysis; specifically, when determining the placement of musical themes, the overall musical form and harmonic structure of a work can be taken into account. However, analyzing a large number of musical themes by hand takes many hours of work. Although it is possible to manually analyze a large body of musical works, these projects often take a number of years to complete. Other analytic musical observations arise from a more intensive examination of a small number of works. Sometimes these works are selected without regard to the representativeness of the complete oeuvre. It could be that the music selection is motivated by pre-existing conceptions, whether or not the theorist is aware of this possibility. This raises the question of the generality of such an analytic claim. In summary, the use of traditional music theory methodologies tends to result in a trade-off: it is either difficult to provide a representative sample of musical works or it will take many years to complete a project.

The current study uses an empirical-based methodology in order to address the two concerns that arise from traditional music theory analysis. The project is a modest attempt to examine specific properties of musical themes in Western art music. Approaches from the areas of music theory, empirical musicology, and psychology are integrated to investigate certain structural characteristics of musical themes, as well as how these characteristics are perceived by musician listeners. The hope is to contribute to the centuries-long discussion regarding musical themes and to suggest productive avenues for further research.

For centuries, first and second themes have been treated as contrasting musical ideas, with opposing emotional capacities and musical structural elements. In musicological and music theoretic writings over the past 300 years, contrasts between themes have been described in two ways: either through the use of descriptive adjectives or metaphors, such as *strong* themes and *lyrical* themes, or by comparing how each theme is constructed. In the late eighteenth and early nineteenth centuries, theorists explained thematic contrasts by using descriptive and metaphorical terms. Common descriptions of first themes included terms like *masculine*, *strong,* and *energetic,*[2] whereas typical descriptions of second themes included terms such as *feminine, lyrical,* and *gentle.*[3] Conversely, twentieth and twenty-first century theorists tend to refer to how the structure of themes can differ. They describe contrasts between themes in terms of structural features like their modality, rhythmic smoothness, articulation, and dynamic markings. Despite these different foci, there exists a broad agreement regarding the expressive tendencies of first and second musical themes. Within today's music theory textbooks, thematic contrasts are described in both the metaphoric sense of the early theorists, as well as in the structural sense of later theorists.

In order to chronicle differences between pairs of first and second themes in Western art music, a corpus study of over one thousand musical works was conducted. The study was motivated by two questions: (1) Can we observe the contrasts between first and second themes described in the extant literature? (2) Can we observe changes in the use of first and second themes over different stylistic musical periods? As we have seen, the descriptive literature characterizes first themes using terms such as *energetic* and *strong*, whereas second themes are

[2] This type of statement was seen in writings by Koch (Koch, 1793/1983), Galeazzi (Churgin, 1968), Kollmann (Kollmann, 1799), and Vogler (Newman, 1963).
[3] Characterizations of second themes can be seen in writings by Vogler (Newman, 1963), Koch (Koch, 1793/1983), Galeazzi (Churgin, 1968), Kollmann (Kollmann, 1799).

characterized using terms like *lyrical* and *gentle.* In order to assess these descriptive claims about thematic contrast, we need to transform theoretical concepts into something we can measure. In other words, it is necessary to operationalize what is meant by descriptive terms like *energetic* and *lyrical*. The descriptive terms about first and second themes were interpreted as having the following repercussions:

Strong or *energetic*: louder dynamic, relatively faster pace, staccato or detached articulation, major mode.

Lyrical, *quiet*, and *gentle*: quieter dynamic, slower pace or tempo, legato articulation, minor mode.

These ideas can be expressed in the form of the following hypotheses. Compared with first themes, second themes are conjectured to be:

H1: more likely to be in the minor mode

H2: more likely to exhibit a slower tempo or pace

H3: more likely to have a quieter dynamic level

H4a: more likely to exhibit smoother (more isochronous) rhythms

H4b: more likely to be legato

H5: First and second themes exhibit different average interval sizes

In order to identify a large sample of musical themes, a convenience sample of encoded musical themes was used: the *Dictionary of Musical Themes* (1948) assembled by Harold Barlow and Sam Morgenstern. The first edition of the *Dictionary* consists of some 9,788 themes from instrumental musical works spanning a period from the late sixteenth to the early twentieth centuries. The *Dictionary* was conceived as a reference tool for identifying the source (composer

and work) of Western art-music melodies or themes (Barlow and Morgenstern, 1948). The *Dictionary* necessarily reflects the musical interests of Barlow and Morgenstern and so many musicologists would regard the *Dictionary* as biased. Indeed, there seems to be a bias toward nineteenth-century orchestral works, with a further bias towards American composers in the twentieth century.

Critical for the purposes of this study, Barlow and Morgenstern labeled the order of themes within works, giving labels such as "first theme" and "second theme." For the purposes of this study, sampled works were limited to those works that contained only two themes. In order to avoid confusion, we excluded any works that also contained a theme labeled "Introduction." A total of 1063 works met this sampling criterion and were included in the main analysis. The sampled music included a wide variety of composers, stylistic musical periods, and musical genres (sonata form, symphonies, ballets, solo instrumental works, chamber works, etc.). However, no vocal music is included in the Barlow and Morgenstern *Dictionary* and so was not considered in this study.

All of the musical scores were encoded in the Humdrum format. Using the Humdrum Toolkit, each musical theme was measured on the features of interest for the current study (Huron, 1993). Numerical values were assigned for each theme's mode, average interval size, pace value, rhythmic smoothness, articulation level, and dynamic level.[4] Therefore, we have numerical values of how first and second themes contrast.

Nonparametric tests were used to compare each pair of first and second themes. The results are detailed graphically in Figure 1.

[4] For details about these measurements, the reader is encouraged to consult the fully documented version, presented in Chapter 3 of my master's thesis.

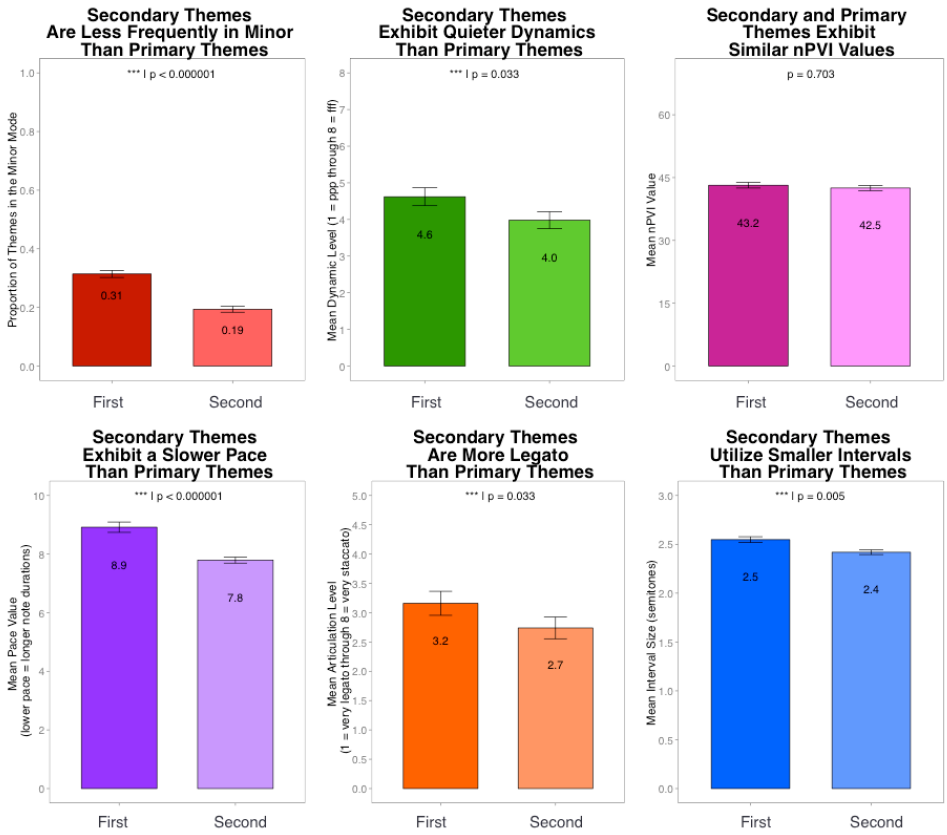

Figure 1. Results of the corpus study indicate that, compared to first themes, second themes are less likely to be in the minor mode. However, compared to first themes, second themes are more likely to involve a quieter dynamic level, make use of a slower tempo, be more legato, and use smaller intervals.

In the case of Hypothesis 1, we predicted that second themes are more likely to be in the minor mode. Using McNemar's test with a binomial distribution, first themes (326/1063, 30.67%) were more likely to be in the minor mode than were second themes (183/1063, 17.21%), $p < 0.000001$. This association is not consistent with the hypothesis.[5]

In the case of Hypothesis 2, we predicted that second themes are more likely to exhibit a slower pace as measured using a "pace" value formula. Using the Wilcoxon Signed-Ranks Test, second themes (mean pace value = 7.647, sd = 4.00) were more likely to exhibit slower pace

[5] For further discussion about musical mode of first and second themes, the reader is encouraged to consult Chapter 3 of my master's thesis.

values than were first themes (mean pace value = 9.01, sd = 7.49), where longer note durations produce lower pace values, $Z = -9.09$, $p < 0.000001$.

In the case of Hypothesis 3, we predicted that second themes are more likely to have a quieter dynamic level. Using the Wilcoxon Signed-Ranks Test, second themes (mean dynamic level = 4.04, sd = 1.62) were more likely to exhibit quieter dynamic levels than were first themes (mean dynamic level = 4.67, sd = 1.72), where higher numbers correspond to louder dynamic levels, $Z = -2.019$, $p = 0.044$.

In the case of Hypothesis 4a, we predicted that second themes are more likely to exhibit smoother rhythms. Using the Wilcoxon Signed-Ranks Test, second themes (mean nPVI = 41.40, sd = 22.71) were not likely to exhibit more isochronous rhythms than were first themes (mean nPVI = 42.27, sd = 25.72), where lower numbers correspond to more smooth rhythms, $Z = -0.390$, $p = 0.697$. In the case of Hypothesis 4b, we predicted that second themes are more likely to be legato. Using the Wilcoxon Signed-Ranks Test, second themes (mean articulation level = 2.79, sd = 1.30) were likely to exhibit more legato markings than were first themes (mean dynamic level = 3.23, sd = 1.43), where higher numbers correspond to less legato/more staccato markings, $Z = -2.135$, $p = 0.033$.

In the case of Hypothesis 5, we predicted that first and second themes were likely to exhibit different average interval sizes. Using the Wilcoxon Signed-Ranks Test, second themes (mean interval size in semitones = 2.43, sd = 0.903) were more likely to exhibit smaller interval sizes than were first themes (mean interval size in semitones = 2.56, sd = 1.08), where higher numbers correspond to larger average intervals, $Z = -2.802$, $p = 0.005$. However, note that the difference between the average interval size in first and second themes is small.

In summary, the experimental findings regarding the durational pace, dynamic levels, and

articulations are consistent with traditional textbook descriptions that first themes are *energetic* and second themes are *lyrical* in nature, given our operationalizations.

Although the study of notated music does indeed reveal structural features that are consistent with the notion of thematic contrast, it does not address whether performers and listeners are sensitive to, or aware of, these contrasts. Therefore, a perceptual study was conducted in order to assess whether musicians can perceive structural differences between first and second themes. The musical features of interest were the structural features examined in the corpus study: average interval size, pace value, rhythmic smoothness, articulation, and dynamics. The study focused on the relationship between first and second themes from the same musical work and consisted of a subset of the works used in the corpus study. The final sample of the perceptual study consisted of 22 works for solo piano, composed in the eighteenth through twentieth centuries.[6] The themes were encoded into the musical software Finale 2014 and MIDI recordings were generated using the Human Playback setting. MIDI recordings were used so the music was heard without interpretative performance nuances, which could lead to noise in the data. This leads to the first hypothesis:

> *H1*. Participants can categorize first and second themes when listening to MIDI sound recordings.

MIDI recordings take score-based data and produce an auditory recording without any performance nuances. However, with the advent of recent technology, it is possible to have MIDI recordings that differ in features like tempo, dynamics, and articulation. For the purposes

[6] The musical sample consisted of first and second themes that are in the same mode. Additionally, all of the musical samples were transposed to have a tonal center of C: musical pairs that were in a major mode were transposed to C Major and musical pairs that were in a minor mode were transposed to c minor. The transposed samples prevented key relationships (such as I – V or i – III) from affecting the discrimination between first and second themes. For more information, the reader is encouraged to consult Chapter 4 of my master's thesis.

of this study, we were mostly interested in how variations in articulation and dynamics affected performance on the discrimination task.[7] Since the inclusion of articulation and dynamics is likely to help in the discrimination between first and second themes, a corollary to the first hypothesis was made:

> *H1b.* People are better at categorizing themes from sound recordings when dynamics and articulation are included than from sound recordings without these features.

An even more reductive approach can be taken when considering the written musical score. Discriminating between first and second themes from a score requires a different set of skills than does an aural analysis. However, the notated music likely does contain information that can allow a person to distinguish between two written themes. For example, the corpus study was conducted only in reference to the notated music. The interest in musical scores leads to a second hypothesis and its corollary:

> *H2*. Participants are able to distinguish first and second musical themes by looking at the information contained in the musical score.
>
> *H2b.* People should perform better on the task when the provided scores include dynamics and articulation than when the given scores do not include this information.

The study consisted of two parts, both based on an alternative forced-choice task. The

[7] These two features, articulation and dynamics, will be manipulated in the main study. The other structural features, such as interval size, durational pace, and nPVI, were not manipulated. The reason that articulation and dynamics were manipulated is because the musical melody is not altered from changing the dynamics and articulation. Changes in nPVI, average interval size, and durational pace would result in an altered musical melody.

first part asked participants to examine the musical score of a pair of musical themes that came from the same work; they were asked to identify which theme they believed comes first in the music. The second part asked participants to listen to recordings of the same musical thematic pairs and to identify which theme was presented first in the music. Both the score-based task and the recording-based task consisted of two conditions: A) musical samples with dynamic and articulative information and B) musical samples without dynamic and articulative information. In order to account for individual variability, the study was designed as a within-subjects design, so participants completed the recording- and score-based tasks with the same conditions of the musical pairs (either with or without dynamic and articulative information).

In each part of the experiment, participants were shown (or heard) two themes from a single musical work on a screen. Participants were asked three questions about each pair of musical themes. They were asked to indicate which theme was the first theme and which theme was the second theme in the musical work. Additionally, they were asked to rate how confident they were in their decision on a continuous scale of 1 to 10, using a slider. The presented order of the musical works was randomized, as was the order of the first and second themes for each musical work. Two samples were randomly chosen to be used twice as an indication of test-retest reliability.

Forty-four participants, primarily from the Ohio State University School of Music, took part in the experiment. The average age was 22.10 (range from 19 to 39). Of these participants, twenty-one (48%) were female. The participants exhibited a wide range of musical training, with a range of 0-25 years of formal music theory training (mean = 3.66). Six participants had one or fewer years of musical training. Participants had a range of 1-30 years of formal instrumental or vocal training (mean = 9.43).

The results of the perceptual study are consistent with the hypothesis that musicians can use structural information from the music to differentiate first and second musical themes, even when the themes are presented outside of the original musical context. When asked which theme came first in a piece of music, participants selected the correct answer 57% of the time (1094/1936 judgments), which was significantly different from chance, $X^2(1) = 32.802$, $p < 0.00001$, as shown in Figure 2.

One of the *a priori* hypotheses was that participants could distinguish first and second themes by looking at the information in the musical score. The data suggest that participants are able to do this at a level statistically different from chance, with 56% of the judgments (539/968) classified as the correct response, $X^2(1) = 12.50$, $p = 0.0004$. The corollary to this hypothesis was that participants should perform better when the provided scores include dynamic and articulative information than when the given scores do not include this information. The results were consistent with this corollary hypothesis, with 56.6% correct judgments in the scores with dynamics and articulation and 54.8% correct judgments in the scores without dynamic and articulation markings. Although these values are close in magnitude, they are statistically different using McNemar's test, $X^2(1) = 5.915$, $p = 0.015$. The results are graphically depicted in the right half of Figure 3.

The other main *a priori* hypothesis was that participants could categorize first and second themes when listening to MIDI sound recordings. Participants were able to perform this task, with 57% of the judgments being the correct answer (555/968), $X^2(1) = 20.831$, $p < 0.0001$. The corollary to this hypothesis was that participants would be better at categorizing themes from sound recordings when dynamics and articulation were included than from sound recordings without this information. The results of this corollary hypothesis were significant according to

McNemar's test, with 58.9% correct judgments in the recordings with dynamics and articulation and 55.8% correct judgments in the recordings without dynamics and articulation, $X^2(1) = 9.820$, $p = 0.0017$. The results are shown graphically in the left half of Figure 3.

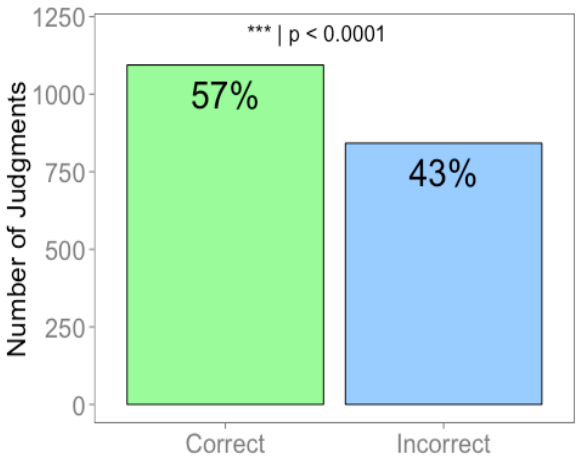

Figure 2**.** Overall judgments of first and second musical themes. Participants were able to discriminate first and second themes in the absence of the original musical context 57% of the time. Although the effect size is small, the effect was statistically different from chance.

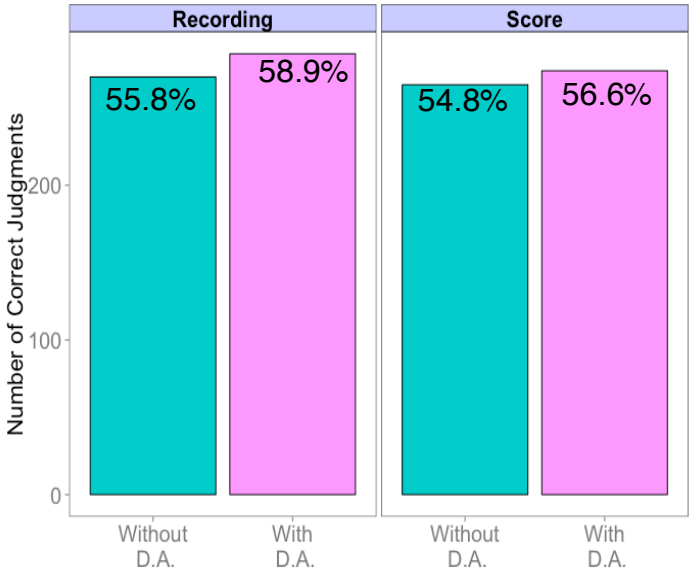

Figure 3. Participants perform slightly better in situations when the music contains articulation and dynamic information ("With D.A.") than when the music does not contain this information ("Without D.A.") for both the score-based and recording-based judgments.

The hope of this project was to contribute to the centuries-long discussion regarding musical themes. By using two main empirical perspectives – a corpus study and a perceptual study – I hoped to provide complementary perspectives regarding the use of contrast in first and second musical themes. The methods I have used provide some empirical support for claims made for hundreds of years about contrasting musical themes. Additionally, the use of empirical methods has helped to provide some insight into which musical and acoustic factors may be perceived by musicians in both visual and auditory settings. Furthermore, the current work can be extended to future research projects. There have been few research studies regarding the perception of musical themes. Future studies can build on the preliminary findings presented here to investigate more fully which factors of the musical structure are perceived by musicians. Finally, it is hoped that other music scholars will be encouraged to use exploratory empirical methods to study changes in musical style throughout history.

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